In the Claims:

Claims 11-22 have been withdrawn.

Claims 2, 5, 9-10, 24, 28 have been amended as follows:

Cancel claims 1, 23 and 27

1. (cancelled)

2. (currently amended) A method ~~**according to claim 1**~~ **of determining a best focus position of an object relative to a reference position in an optical imaging system, comprising the steps of:**

a) forming a dark-field image of the object at different focus positions, each said dark-field image having a corresponding image intensity distribution with an average intensity and a variance of intensity;

b) forming a set of contrast values by calculating a contrast value for each said dark-field image based on said variance and said average intensity ; and

c) determining the best focus position by fitting a Lorentzian function to said set of contrast values plotted as a function of said different focus positions;

[[~~;~~]] wherein said step b) further includes the steps of:

d) digitizing each said dark-field image such that said image intensity distribution for each said dark-field image is a digitized image intensity distribution comprising discrete gray-scale intensity levels I_n corresponding to a discrete plurality of n pixels; and

e) arranging each said digitized image intensity distribution into a histogram, $H(I_n)$, of an amount of said pixels having a given said gray-scale intensity level, I_n.

3. (original) A method according to claim 2, further including the steps of:

f) calculating said average intensity for each said discrete image intensity distribution via the equation

$$\langle I \rangle = \frac{\sum_{I_n} H(I_n) I_n}{\sum_{I_n} H(I_n)};$$

g) calculating said variance for each said discrete image intensity distribution via the equation

$$\sigma_I^2 = \frac{\sum_{I_n} H(I_n)(I_n - \langle I \rangle)^2}{\sum_{I_n} H(I_n)};$$

h) calculating said contrast value, C, for each said discrete image intensity distribution via the equation

$$C = \frac{\sigma_I}{\langle I \rangle}.$$

4. (original) A method according to claim 3, wherein in said step c) of determining the best focus position includes performing a curve fit to the equation

$$C = a_1 + \frac{a_2}{(z - a_3)^2 + a_4},$$

wherein a_1, a_2, a_3 and a_4 are Lorentzian curve-fitting parameters, z indicates a distance along a focus direction, and said parameter a_3 corresponds to the best focus position along said focus direction.

5. (currently amended) A method according to claim **[[~~1~~]] 2**, wherein the object comprises a region of interest on a substantially reflective substrate.

6. (original) A method according to claim 5, wherein said region of interest includes a pattern formed on said substrate.

7. (original) A method according to claim 6, wherein said pattern is a predetermined structure capable of scattering light.

8. (original) A method according to claim 6, wherein said pattern is surface roughness.

9. (currently amended) A method according to claim **[[~~1~~]] 2**, wherein said reference position is a coordinate system of an apparatus that forms said plurality of dark-field images.

10. (currently amended) A method according to claim **[[~~1~~]] 2**, wherein the optical imaging system has a depth of field, and an effective focusing range of up to 10 times said depth of field.

11-22 (withdrawn)

23. (cancelled)

24. (currently amended) **~~A method in a computer system according to claim 23~~** **In a computer system, a method of determining the best focus position of an object relative to a reference position, based on a plurality of dark-field images of the object, comprising the steps of:**

a) storing, in a computer readable medium, data corresponding to

the plurality of dark-field images, each said dark-field image being associated with a different focus position and having an associated image intensity distribution with an average and a variance;

b) **forming, in said computer system, a set of contrast values by calculating a contrast for each said dark-field image, based on said variance and said average; and**

c) **determining, in said computer system, the best focus position by fitting a Lorentzian function to said set of contrast values plotted as a function of said different focus positions;**

wherein said step b) further includes the steps of:

d) digitizing each said dark-field image with said image intensity distribution for each said dark-field image having a digitized image intensity distribution comprising discrete gray-scale intensity levels, I_n corresponding to a discrete plurality of n pixels; and

e) arranging each said digitized image intensity distribution into a histogram, $H(I_n)$, of an amount of said pixels having a given said gray-scale intensity level, I_n.

25. (original) A method in a computer system according to claim 24, further including the steps of:

f) calculating said average intensity for each said discrete image intensity distribution via the equation

$$\langle I \rangle = \frac{\sum_{I_n} H(I_n) I_n}{\sum_{I_n} H(I_n)};$$

g) calculating said variance for each said discrete image intensity distribution

via the equation

$$\sigma_I^2 = \frac{\sum_{I_n} H(I_n)(I_n - \langle I \rangle)^2}{\sum_{I_n} H(I_n)};\ \text{and}$$

h) calculating said contrast value, C, for each said discrete image intensity distribution via the equation

$$C = \frac{\sigma_I}{\langle I \rangle}.$$

26. (original) A method in a computer system according to claim 25, wherein said step c) of determining the best focus position includes performing a curve fit to the equation

$$C = a_1 + \frac{a_2}{(z - a_3)^2 + a_4},$$

wherein a_1, a_2, a_3 and a_4 are Lorentzian curve-fitting parameters, z indicates a distance along a focus direction, and said parameter a_3 corresponds to the best focus position along said focus direction.

27. (cancelled)

28. (currently amended) A computer readable medium ~~according to claim 27~~ **capable of holding data corresponding to at least four dark-field image intensity distributions measured at different focus positions, and holding instructions for determining a best focus position based on said data, by performing the steps of:**

a) calculating an average intensity and a variance for each of said

<u>dark-field image intensity distributions;</u>

<u>b)</u> **<u>forming a set of contrast values by calculating a contrast value for each image intensity distribution based on said variance and said average intensity; and</u>**

<u>c)</u> **<u>determining the best focus position by fitting a Lorentzian function to said set of contrast values plotted as a function of said different focus positions</u>** **[[~~;~~]]**

wherein said step b) further includes the steps of:

d) digitizing each said dark-field image such that said image intensity distribution for each said dark-field image is a digitized image intensity distribution comprising discrete gray-scale intensity levels, I_n, corresponding to a discrete plurality of n pixels; and

e) arranging each said digitized image intensity distribution into a histogram, $H(I_n)$, of an amount of said pixels having a given said gray-scale intensity level, I_n.

29. (original) A computer readable medium according to claim 28, further including the steps of:

f) calculating said average intensity for each said discrete image intensity distribution via the equation

$$\langle I \rangle = \frac{\sum_{I_n} H(I_n) I_n}{\sum_{I_n} H(I_n)};$$

g) calculating said variance for each said discrete image intensity distribution via the equation

$$\sigma_I^2 = \frac{\sum_{I_n} H(I_n)(I_n - \langle I \rangle)^2}{\sum_{I_n} H(I_n)}\text{; and}$$

h) calculating said contrast value, C, for each said discrete image intensity distribution via the equation

$$C = \frac{\sigma_I}{\langle I \rangle}.$$

30. (original) A computer readable medium according to claim 29, wherein said step c) of determining the best focus position includes performing a curve fit to the equation

$$C = a_1 + \frac{a_2}{(z - a_3)^2 + a_4},$$

wherein a_1, a_2, a_3 and a_4 are Lorentzian curve-fitting parameters, z indicates a distance along a focus direction, and said parameter a_3 corresponds to the best focus position along said focus direction.